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This is to certify that the thesis prepared by Andrew D. Zima, Jr., B.S., M.S., D.D.S.,
entitled THE EFFECTS OF MOTIVATIONAL INTERVIEWING IN PREGNANCY
ON KNOWLEDGE AND RETENTION OF INFANT ORAL HEALTH
INFORMATION

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THE EFFECTS OF MOTIVATIONAL INTERVIEWING IN PREGNANCY ON
KNOWLEDGE AND RETENTION OF INFANT ORAL HEALTH INFORMATION

A thesis submitted in partial fulfillment of the requirements for the degree of Masters of
Science in Dentistry at Virginia Commonwealth University.

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Abstract

THE EFFECTS OF MOTIVATIONAL INTERVIEWING IN PREGNANCY ON KNOWLEDGE AND RETENTION OF INFANT ORAL HEALTH INFORMATION

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A thesis submitted in partial fulfillment of the requirements for the degree of Masters of
Science in Dentistry at Virginia Commonwealth University.

Virginia Commonwealth University, 2010

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Purpose: The purpose was to examine the effect of motivational counseling in pregnancy with readiness and acceptance of infant oral health information.

Methods: The study used a prospective cohort design to examine the effect of prenatal education and motivational counseling with expectant mothers about infant oral health care readiness. Participants were all enrolled in a prenatal care program called Centering Pregnancy offered by VCU's Department of Obstetrics and Gynecology. They all completed a pre-survey questionnaire, followed by a motivational counseling intervention, and then completed a post-survey questionnaire. A third survey was sent out 1 year post-partum. The participants were evaluated for their willingness to accept

information, their knowledge about infant oral health, and the retention and implementation of infant oral health information.

Results: A sample of 87 pregnant women completed the pre- and post-survey and 11 of these participants completed and mailed back the 1 year post-partum survey. Based on the analysis of the readiness (RAPIDD scale) responses, the participants showed statistically significant overall improvements in their pre versus post survey openness to health information ($p < .0039$) and value for dental health ($p < .001$). The results for the knowledge portion of the survey demonstrated an increase in their infant oral health education, showing a significant change across time ($p < .0001$) from the pre survey to both the post and 1 year post partum surveys. The results to the last portion of the pre, post, and 1 year survey illustrated that the participants learned at what age to establish a dental home for their infant.

Conclusion: This study has shown that with the proper educational tools parents are able to accept and improve their knowledge related to infant oral health and the prevention of early childhood caries. Data suggests that parents are implementing routine home infant oral health measures, but fewer have established a dental home by age 1.

Introduction

Most first time parents in the United States receive limited information regarding infant oral health preventive practices. Many new mothers are not aware of the importance of prevention of dental caries in the primary dentition. This lack of knowledge can not only seriously affect the primary dentition of their children but without proper intervention also hinder healthy development of the permanent dentition. Caries in primary teeth can adversely affect children's growth, resulting in significant pain, potentially life-threatening infections, and a diminished overall quality of life.¹ Issues such as; the timing of their child's first dental visit, what is considered a healthy diet for teeth, how to and how often to brush their child's teeth, and what to expect when primary teeth start erupting are critical topics for new mothers to comprehend.² Demographically, those with a low dental IQ and limited access to dental care are represented by poor or minority families.³ Due to this fact dental caries are 32 times more likely to occur in infants who are of low socioeconomic status and whose mothers have a lower education level compared to the general population.¹ In a recent study, a group of expecting mothers were given a forty-five minute lecture on child oral healthcare, as well as a pre- and post-lecture survey. When the two surveys were compared, it was found that the mothers had an improved knowledge of oral health.² Reaching out to these mothers and educating them about the importance of good oral health could help decrease the

incidence of early childhood caries and subsequently reduce existing trends of permanent dentition being affected by uninformed dental habits.

Studies have shown that given the proper tools, mothers are able to learn and improve their preventive oral health practices, aiding in the healthy development of their children's dentition. A study by Finlayson et al. found a positive association between a parents' knowledge of children's oral hygiene and the oral health status of their children. They stated that "it is unrealistic to expect mothers to conscientiously practice oral health promoting behaviors without understanding that baby teeth are important and require care and cleaning and can develop caries".⁴ Several studies have investigated the effect of education on the knowledge and oral health practices (measured by plaque score) of parents and their children between 0-5 years of age. Outcomes were measured at 1 month and 6 months, and it was found that parents performed better at the 1 month post lecture along with a decrease in the plaque score compared to baseline.⁵ It was concluded that parents require periodic reinforcement of the educational workshop to continue/maintain the decrease in their child's plaque score. This study demonstrated that with proper education and guidance mothers can be motivated about maintaining good oral health practices for their children. Dental health interventions have concluded that parents who received their multi-stage intervention were more likely to report adoption of three positive oral health behaviors; using a trainer cup from one year of age, using safe drinks and brushing twice a day with fluoride toothpaste.⁷ As a result of the intervention, there was an increase in the attendance of mothers at clinics (dental recall) and health centers for the 8-month check up.⁷ Another study focused on children 5-15 years of age where an

educational program on gingival health was administered.⁹ There was a questionnaire at baseline in addition to the child's whole mouth Loe-Silness Gingival index (GI) and Turesky Modification of Quigley-Hein Plaque Index (PI).⁹ Four weeks later the children completed the questionnaire to assess their oral health knowledge and were reexamined using the same indices.⁹ They found the participants to have greater knowledge with respect to optimal brushing time and optimal frequency of dental visits, as well as a reduction in both the GI and PI.⁹ Providing the information is the critical first step in effectively making a difference in the education process, but what some researchers have also considered is the influence of parental knowledge and readiness to the instructional method used in giving the educational intervention.

Effective oral health education is dependent on the readiness of the individual to accept new knowledge and their motivation to change existing behaviors. Assessments of parental readiness to change is useful in planning how to communicate with the parent about problematic parenting behaviors.¹⁵ The Readiness Assessment of Parents concerning Infant Dental Decay (RAPIDD) Scale was developed to assess a parent's stage of change – precontemplative, contemplative, or action – with regard to his/her child's dental health.¹⁵ This instrument based on the work by Prochaska and DiClemente, measures pro and con parental beliefs about caring for their child's teeth.¹⁶ Two constructs were developed that assess the pros, Openness to Health Information and Valuing Dental Health, and two constructs, Convenience and Change Difficulty, and Child Permissiveness, assess the cons or barriers to change. This instrument was assessed according to the reliability (internal consistency) and validity (construct validity) of the

RAPIDD Scale.¹⁵ The study presented evidence that the Stages of Change Theory has utility in understanding the beliefs and behaviors of parents with children at high risk for early childhood caries.¹⁵ The RAPIDD Scale, designed to assess readiness to change parenting practices impacting children's oral health, showed preliminary reliability and validity and has promise in helping to understand and eventually change deleterious parenting practices.¹⁵

A second aspect is the instructional method and approach that is taken to deliver the infant oral health education. The traditional “advice-giving” approach to health behaviors has not been shown to be effective. Patients have reservations about “being told what to do,” and that direct persuasion puts the patients into a defensive position. Strategies for providing education and direction to patients regarding oral health are changing from the traditional persuasion approach of health education to individualized interventions such as Anticipatory Guidance and Motivational Interviewing. Motivational interviewing (MI) is defined as a brief counseling approach that focuses on the skills needed to motivate others—provides strategies to move patients from inaction to action. MI has been used with success in a variety of health conditions such as drug addiction, diabetes, diet behaviors, and medication compliance. MI has been used to counsel parents and mothers of infants and children at high risk for dental caries.¹² The goal of a MI counseling session is to establish rapport with the parents/mothers and then provide and discuss a “menu of options” for infant oral health and caries preventive behavior.¹⁴ MI focuses on techniques such as open-ended questioning, affirmations, and the reinforcement of self-efficacy, reflective listening, and summarizing, all used in a

directive manner.¹¹ Counselors encourage the parents to talk and are supportive listeners without judgment. They help the parent to identify the discrepancies between their current behavior and the goal of dental health for their child.

Evidence for the effectiveness of advice giving (information with persuasion) for lifestyle change is only 5-10 %.¹⁰ Children of mothers who received MI had a 46% lower rate of decayed, missing and filled teeth, “dmft” after 2 years than subjects in the control groups.¹¹ In another study, children whose mothers had at least two counseling sessions had significant fewer decayed surfaces than children at baseline.^{13,16} An additional study provided information (video and pamphlet) to one group of mothers (control) and motivational interviewing (MI) plus the video and pamphlet to the second group.⁶ At a two year follow-up the children whose mothers received both the information and MI exhibited significantly less new caries than those of the control group.⁶ These techniques have been shown to be effective in decreasing levels of early childhood caries in the children of mothers who received this instruction.

The purpose of this study was to examine the effect of prenatal education and motivational counseling with pregnant women on readiness and preventive behaviors related to infant oral health.

Materials and Methods

This study used a prospective cohort design to examine the effect of prenatal education and motivational counseling with pregnant women about infant oral health care. The study was approved for human subjects by the Virginia Commonwealth University Institutional Review Board. The expectant mothers received infant oral health information via a motivational counseling format around the 8th month of their pregnancy. The mothers already filled out an infant oral health survey prior to receiving motivational counseling. Immediately after the counseling session, patients filled out the post-survey. A third survey was sent out 1 year post-partum. This study focused on the knowledge and retention of infant oral health information by the expecting and new mothers. The effectiveness of the motivational counseling educational method was then evaluated.

Women who were enrolled in a prenatal care program called Centering Pregnancy (offered by VCU's Department of Obstetrics and Gynecology) were the population sampled for the prospective cohort. In the Centering Pregnancy Program, women were grouped together with 8-12 other women with similar due dates to receive prenatal education and medical care. The Centering Pregnancy Program alters routine prenatal care by bringing women out of exam rooms and into groups for their care. Women have their initial intake into their obstetric care in the usual manner with history and physical examinations occurring within the clinical space. They are then invited to join 8-12 other women with similar due dates in meeting together regularly during their pregnancy. The groups form at the end of the first trimester and continue through the

early postpartum period meeting every month (approximately 10 sessions). As women come to the group they engage in self-care activities of weight and blood pressure, estimating gestation age and recording in their own medical chart. This program of prenatal care is a model of empowerment for both women to take control of their bodies, pregnancies, families, as well as the health care provider to share their care-giving with their clients.²¹ The groups of expectant mothers were provided with infant oral health counseling during session 9, approximately their 8 month of pregnancy.

The Centering Pregnancy sessions are approximately 2 hours long and a 30-minute portion of session 9 was devoted to infant oral health education through an instructional seminar that utilizes motivational interviewing techniques. At the prior session (session 8) a pre-survey was completed by the women to assess their stage of readiness for change (RAPPID scale) and baseline knowledge of infant oral health. One month later (session 9), an instructional seminar and counseling session about infant oral health took place. At the end of this session a post-survey was completed by the same women. The infant oral health seminar/counseling session was based on motivational techniques used in preventive infant oral health programs.¹⁴

This study provided a pre, post and 1 year post partum measure of the mother's oral health knowledge and set the stage of readiness for the acceptance of infant oral health education and impact of infant oral health education/counseling on the mother. The study also looked at the degree the mothers' retained and implemented the information from the motivational counseling. The pre-survey instrument includes both oral health knowledge measures and the RAPIDD scale. The RAPIDD scale is a measure of parental readiness to change children's dental behaviors. The instrument is based on four constructs: Openness to Health Information, Valuing Dental Health, Convenience/Difficulty, and Child Permissiveness.¹⁵ The survey

instrument has been modified and tailored to expectant mothers. The 1 year post-partum survey included the same openness, value, and knowledge questions as the pre and post surveys. Additionally, the 1 year post-partum survey included questions from two other constructs of the RAPIDD scale. Two questions were part of the Convenience and Change Difficulty construct and two questions were from the Child Permissiveness construct. Also, the 1 year survey had questions regarding the implementation of infant preventive oral health behaviors.

The outcome variable was the pregnant mother's knowledge of oral health and readiness to change dental behaviors measured pre- and post- educational intervention and at 1 year post-partum. Knowledge scores were calculated by summing 12 knowledge items, while 7-items were used to construct a mean score for each construct of the readiness RAPIDD scale. Pre versus post versus 1 year post-partum comparisons were accomplished using repeated-measures analysis. In the case of continuous outcomes, repeated-measures mixed-models analysis was used and in the case of binary outcomes, repeated-measures logistic regression was used by a GEE (generalized estimating equations) approach. SAS software was used (SAS version 9.2 and JMP version 8.0, SAS Institute Inc, Cary NC). 1 year post-partum RAPIDD scale questions from the Convenience/Difficulty and Child Permissiveness constructs as well as oral health implementation questions were evaluated descriptively.

Results

Ninety two pregnant women completed the pre- and post-survey and 5 of these did not want to participate in the study (n=87). Thirty of these participants were sent 1 year post-partum surveys and 11 were returned. Participants were predominantly white (66%) who had finished college (74%), as seen in Table 1. The average age was 29.1 years (SD = 4.61, range = 20–42).

The first part of the survey contained seven items related to the constructs of openness to health information and valuing dental health. The summary description for each item and the subscales is shown in Table 2. For each item, patients were asked to rate their agreement between “strongly agree” (SA) and “strongly disagree”. On the first item, “I get help on how to take care of my baby from TV, magazines, newspaper, books or the internet,” 22% “strongly agreed” during the pre-test, 30% during the post-test, and 25% at the 1 year post-partum survey. A mean score was calculated by assigning numeric values to these Likert-scale options. A value of 1 was assigned for SA through a 5 for SD. Using this measure, the pre-test mean of the first item was 2.21, the post-test mean was 2.06, and the 1 year post-partum mean was 2.25. These means correspond to the “agree” response. All of the means for each RAPIDD construct category was then averaged to see the overall openness to health information and value for dental health information. Numerical values closer to 1 for these two constructs place the groups in the “action” part of the RAPIDD assessment while values approaching 5 would indicate being in the pre-contemplative stage of readiness.

Post-partum RAPIDD responses are shown in Table 2 for Convenience/Difficulty and Child Permissiveness constructs. Questions 8 and 9 are for the convenience/difficulty construct while questions 10 and 11 are for the child permissiveness construct. For this study they are not grouped together and averaged, but used descriptively. These categories indicate barriers to proper infant oral health action. Higher numerical values for these two constructs indicate lower barriers to the “action” stage of implementing proper infant oral health practices, while lower numerical values indicate higher barriers to the “action” stage. Results from the 1 year post-partum surveys ranged from 2.91 to 3.64, indicating moderate to significant amount of barriers present that could make implementation of proper infant preventive oral health behaviors difficult.

The pre- versus post-versus 1 year post-partum comparison on these items was accomplished using a repeated-measures analysis of variance. Factors in the model included period (pre, post, 1yr), content area (openness items 1-4, valuing items 5-7). The results indicate that there was a significant difference across the three time periods in openness to health information ($p = .0039$) and in valuing dental health ($p < .0001$). The LS means for each area at each time point are shown in Table 3 and **Error! Reference source not found..** In both cases, the Pre is different than the Post but the 1yr response is not significantly different than either of the other time points (by Tukey’s HSD).

There were also eleven knowledge items included on the questionnaire at all three time points. The summary of the responses is shown in Table 4. The pre- versus post- comparison was accomplished using a GEE repeated-measures logistic regression approach with an exchangeable correlation structure. Factors in the model included period pre, post, and 1yr. There was a

significant change across time ($p < 0.0001$). The percentage yes improved from pre 67.5 (95% CI = 60 – 87) to post 88.5 (95% CI = 86 – 91) to 1yr 88.9 (95% CI = 85 – 92). There was a statistically significant difference between the pre and both the post and 1yr ($p < .0001$)

Questions 24-29 in the 1 year post-partum survey were to determine whether the mothers' implemented preventive infant oral health behaviors that they obtained during the motivational counseling session. The data showed that of the expectant mothers 91% brush/wipe the child's teeth daily, 64% use a toothpaste or cleaner, 27% use a bottle or sippy cup for naps or at night, 18% had taken their child to see a dentist by age 1, and 70% of the mothers had cavities in their own teeth in the past 5 years. (Table 5)

Finally, subjects were asked "At what age should a child first see a dentist". The summary shows that nearly half of patients during the pre-survey did not know that the correct answer is "at 1 year" but that all knew this on the post and 1 year surveys. (Table 6).

Discussion

The assessment of parental readiness is a crucial factor in determining how a particular individual will implement new information. In a study that tested the RAPPID scale, Weinstein and Riedy, concluded that it is a reliable and valid tool in assessing readiness to change parenting practices impacting children's oral health.¹⁵ In terms of the RAPPID scale in this population of expectant mothers, the overall pre-test least square mean improved from 1.62 to 1.42, meaning that the participants were highly open to health information and that they valued dental health. Across the intervention, results indicated there was a statistically significant change in the both the openness area($p=.0039$) and in the valuing area($p < .0001$). This indicated that the subjects became more open to the idea of receiving health information, and that their value in dental health improved significantly after the intervention. More studies will be needed to understand whether this statistical significance is clinically significant. There was no statistical difference in the openness and valuing areas between the 1 year post-partum surveys and either the pre or post surveys. This is likely due to the low number of samples for the 1 year post partum survey at this time. Results indicate that at 1 year post partum, respondents were less open to health knowledge than on the pre-survey and their value for dental health was between that of the pre and post survey. The use of MI as a tool in this study points to improvement in the openness and valuing of infant oral health but that it most likely needs reinforcement and continued counseling with technical assistance to improve compliance with preventive infant oral health behaviors.

Proper knowledge regarding infant oral health care is an important factor in being able to implement proper oral health care for infants. In a study by Finlayson, et al it was shown that once parents have increased knowledge regarding oral health care, an improvement the oral health of that group was seen. Another study by Martignon showed short term decrease in the plaque score in children following presentation of oral health information. Weinstein discussed the promise of motivational interviewing as a tool to deliver infant oral health information as it was successfully used to help people control alcohol and drug addictions. This study showed a statistically significant ($p < .0001$) increase in participants' infant oral health knowledge from the pre (67.5) to post (88.5) surveys and from the pre to 1 year post-partum (88.9) surveys. There was no significant different between the post and 1 year post-partum surveys. This indicates the participants have an increased knowledge from the MI intervention and that at a time point approximately 1 year later, they have retained that information.

The first year after a child is born is a very busy time for the parents and each child has his/her own temperament. There can be many challenges that make implementing preventive infant oral health behaviors difficult. These are things such as the child acting out when they have their teeth brushed or when they don't get a bottle or sippy cup to bed with them at night. The 1 year post-partum survey had four questions from the RAPIDD assessment that focused on barriers to achieving a change to action in infant oral health care. Two of the questions were from the Convenience/Difficulty construct and 2 were from the Child Permissiveness construct. These possible responses ranged from 1(SA) to 5(SD) for these two constructs. A response of strongly agree suggests a significant barrier to changing to action while a response of strongly disagree would indicate the absence of barriers to changing to action. The mean 1 year post-partum values for the convenience/difficulty questions were 3.27 ± 1.01 and 2.91 ± 1.51 , while the

mean values for the child permissiveness questions were 3.20 ± 1.62 and 3.64 ± 1.03 . These values indicate a moderate amount of barriers present that may make implementing infant oral health information difficult.

Implementation of proper infant oral health methods, thus leading to decreased caries in children is the ultimate goal of infant oral health education. The 1 year post-partum survey asked a series of questions regarding the behavioral responses of the caregivers to see whether they had implemented the knowledge from the MI intervention. The data showed that of the expectant mothers 91% brush/wipe the child's teeth daily, 64% use a toothpaste or cleaner, 27% use a bottle or sippy cup for naps or at night, only 18% had taken their child to see a dentist by age 1. The data indicates that parents are implementing preventive oral health techniques by brushing, using toothpaste, and not using a bottle or sippy cup at night. However, less than 20% of parents had taken their child to the dentist by age 1. Studies by Martignon et al. have shown that education without periodic reinforcement is ineffective. Thus, it is important for parents to take their children to the dentist not only to assess the risk and oral health status of the child, but also to reinforce the educational aspect to the family.

This study did have a few limitations related to selection bias of the population of expectant mothers enrolled. The expectant mothers involved were actively seeking information regarding themselves and their future child just by the fact that they participated in Centering Pregnancy. This may have skewed the results toward our favor, producing significant changes. Another limitation is that our sample size was small due to the fact that not all the mothers enrolled in Centering Pregnancy were 1 year post-partum and eligible to receive the 3rd survey, not allowing for a wider spectrum of results. Lastly, the low current number of 1 year post-partum respondents may not provide an accurate enough description of the entire population that

was provided the MI intervention. This research is an ongoing effort and the number of surveys will increase over time as the study continues.

A future study that may show the efficacy of the MI education model for infant oral health would have a control group of expectant mothers not participating in the Centering Pregnancy group complete the same pre and 1 year post-partum surveys. This would show whether there is a significant difference in the behavior regarding oral health practices in those mothers that participated in the MI intervention.

Several policy implications come to mind when reviewing these results, for instance a policy implication regarding the establishment of a dental home for infants and expectant mothers. This would provide an excellent foundation for the prevention of early childhood caries. Secondly, the possibility of new legislation with Medicaid/SCHIP, healthcare reform or both that may provide coverage for oral health services for expectant mothers and their infants for certain periods of time, from pregnancy to when the child reaches a particular age. Effective preventive interventions are needed that may be applied across the spectrum of health care providers and appropriate settings to address the disparities in oral health that affect high-risk infants.

Conclusion

Knowledge of and value for infant oral health are key aspects in decreasing the prevalence of early childhood caries in children. The sooner proper educational tools are provided to parents and they perceive value in achieving a high level of infant oral health, the greater chance they will implement their new found skills to their children. Whether the parent is ready to receive the knowledge is a challenge to all pediatric health care providers. The RAPPID scale is a valuable instrument that will aid the practitioner in determining whether a parent is likely to accept and apply the information he or she has received. Once it is evident that the parent is willing to accept the educational intervention then the next step would be to provide the information using motivational interviewing techniques. This method of instruction provides the least intimidating and most responsive form of interaction between a dental practitioner, nurse, or “lay” healthcare worker and parent. It allows for free discussion about concerns and leaves the parents at ease about their child’s oral health. In conclusion, this study has shown that with the proper educational tools parents are able to accept and improve their knowledge related to infant oral health and the prevention of early childhood caries. Parents that underwent the MI intervention tended to implement preventive infant oral health behaviors at home but fewer had establish a dental home by age 1.

Literature Cited

1. American Academy of Pediatric Dentistry: Clinical guideline on infant oral health care. Pediatric Dentistry. 2004-2005;67-69
2. Kaste L, Sreenivasan D, Koerber A, Punwani I, Fedvi S. Pediatric oral health knowledge of african american and hispanic of mexican origin expectant mothers. Pediatric Dentistry 2007;29:287-292
3. Mouradian W. The face of a child: children's oral health and dental education. Journal of Dental Education 2001;65:821-831
4. Finlayson T, Delva J, Sohn W, Siefert K, Ismail A. Reliability and validity of brief measures of oral health-related knowledge, fatalism, and self-efficacy in mothers of african american children. Pediatric Dentistry 2005;27:422-427
5. Martignon S, Gonzalez M, Santamaria R, Jacome-Lievano S, Munoz Y. Oral-health workshop targeted at 0-5yr.old deprived children's parents and caregivers: effect on knowledge and practices. The Journal of Pediatric Dentistry 2006;31:104-108

6. Benton T, Harrison R, Weinstein P. Motivating mothers to prevent caries. JADA 2006;137:789-793
7. Hamilton F, Davis K, Blinkhorn A. An oral health promotion programme for nursing caries. International Journal of Pediatric Dentistry 1999; 9:195-200
8. Davies G, Duxbury J, Boothman N, Davies R, Blinkhorn A. A staged intervention dental health promotion programme to reduce early childhood caries. Community Dental Health 2005;22:118-122
9. Biesbrock A, Walters P, Bartizek R. Initial impact of a national dental education program on the oral health and dental knowledge of children. The Journal of Contemporary Dental Practice 2003;4:1-7
10. Britt E, Hudson S, Blampied M. Motivational interviewing in health setting. Patient Educ Couns 2004;53:47-155
11. Harrison R, Benton T, Everson-Stewart S, Weinstein P. Effect of motivational interviewing on rates of early childhood caries: a randomized trial. Pediatric Dentistry 2007;29:16-22
12. Weinstein P. Behavioral problems in the utilization of new technology to control caries: patients and provider readiness and motivation. BMC Oral Health 2006;6:Suppl 1

13. Harrison R, Wong T. An oral health program for an urban minority population of preschool children. *Community Dent Oral Epidemiol* 2003;31:392-399
14. Weinstein P. Motivate your dental patients: a workbook. 2002. Seattle: University of Washington
15. Weinstein P, Riedy CA. The reliability and validity of the RAPIDD scale: readiness assessment of parents concerning infant dental decay. *ASDC J Dent Child* 2001;68:129-135
16. Prochaska J, DiClemente C. The transtheoretical approach: crossing traditional boundaries of change. Homewood: Dorsey Press 1984
17. Kay EJ, Locker D. Oral health promotion and caries prevention. *Prim Dent Care* 1999;6(1):35-37
18. Sohn W, Ismail AI, Tellez M. Efficacy of educational interventions targeting primary care providers practice behaviors: an overview of published systematic reviews. *J Public Health Dent* 2004;64(3):164-172
19. Burke BL, Arkowitz H, Menchola M. The efficacy of motivational interviewing: a meta-analysis of controlled clinical trials. *J Consult Clin Psychol* 2003;71:843-861
20. Rubak S, Sandbaek A, Lauritzen T, Christensen B. Motivational interviewing: a systematic review and meta-analysis. *Br J Gen Pract* 2005;55:305-312

21. Centering Pregnancy Program, Centering Healthcare Institute Inc. 2008.

www.centeringpregnancy.org.

APPENDIX A

Infant Oral Health MI Toolbox

It is okay to add juice or sweet things to a baby's bottle

When weaning a baby from the breast/bottle; it is important to focus on nighttime

Babies should be held when feeding

Putting your baby to bed with a bottle can cause cavities

Baby's teeth should be cleaned as soon as they appear

If your baby wakes at night, give them water

Babies should first see the dentist at one year of age

Adults with cavities can pass tooth decay germs to children

Cavities in baby teeth need to be fixed

Fluoride can be used to coat and protect the teeth of infants and children

APPENDIX B

Infant Oral Health Survey

ID#

1. I get guidance on how to take care of my baby from TV, magazines, newspaper, books or the internet

☐ Strongly Agree

☐ Strongly Disagree

☐ Agree

☐ Disagree

☐ Neutral

2. It will be easy to change any habits I may have to help decrease my child's chance of getting cavities.

☐ Strongly Agree

☐ Strongly Disagree

☐ Agree

☐ Disagree

☐ Neutral

3. I feel comfortable asking questions at the health center regarding the baby.

☐ Strongly Agree

☐ Strongly Disagree

☐ Agree

☐ Disagree

☐ Neutral

4. Keeping my baby's teeth healthy is important to me.

☐ Strongly Agree

☐ Strongly Disagree

☐ Agree

☐ Disagree

☐ Neutral

5. My baby will benefit from my cleaning his/her teeth.

☐ Strongly Agree

☐ Strongly Disagree

☐ Agree

☐ Disagree

☐ Neutral

6. I like the idea of a health person putting medicine on my baby's teeth to protect them from getting cavities.

☐ Strongly Agree

☐ Strongly Disagree

☐ Agree

☐ Disagree

☐ Neutral

8. Dental visits are as important as regular medical check-ups.

☐ Strongly Agree

☐ Strongly Disagree

☐ Agree

☐ Disagree

☐ Neutral

9. Putting a child to bed with a bottle containing milk can cause cavities.

☐ Yes

☐ No

☐ Don't know

10. Putting a child to bed with a bottle containing juice can cause cavities.

☐ Yes

☐ No

☐ Don't know

11. Fluoride helps prevent tooth decay.

☐ Yes

☐ No

☐ Don't know

12. Fluoride can be used to coat and protect the teeth of infants and children.

☐ Yes

☐ No

☐ Don't know

13. Bacteria and germs on the teeth help to produce cavities.

☐ Yes

☐ No

☐ Don't know

14. Adults who have cavities can pass tooth decay germs to their children.

☐ Yes

☐ No

☐ Don't know

15. A child should have their teeth brushed by their parents, until they have shown capability.

☐ Yes

☐ No

☐ Don't know

16. A child should see a dentist at 1years old.

☐ Yes

☐ No

☐ Don't know

17. Snacking in between meals is healthy, keeps baby teeth nourished.

☐ Yes

☐ No

☐ Don't know

18. Do you have or have you had cavities in you teeth in the last 5 years?

☐ Yes

☐ No

19. What is your race?

20. How many years of education do you have?

21. What is your age?

ID#

Baby's approximate due date (month, year):

Name

Mailing Address

Phone #

Permanent contact if mailed returned

Address

Phone #

APPENDIX C*Infant Oral Health Survey*

1. I get help on how to take care of my baby from TV, magazines, newspaper, books or the internet.

☐ Strongly Agree

☐ Strongly Disagree

☐ Agree

☐ Disagree

☐ Neutral

2. It will be easy to change any habits I may have to help decrease my child's chance of getting cavities.

☐ Strongly Agree

☐ Strongly Disagree

☐ Agree

☐ Disagree

☐ Neutral

3. I feel comfortable asking questions at my health care provider regarding the baby.

☐ Strongly Agree

☐ Strongly Disagree

☐ Agree

☐ Disagree

☐ Neutral

4. Keeping my baby's teeth healthy is important to me.

☐ Strongly Agree

☐ Strongly Disagree

☐ Agree

☐ Disagree

☐ Neutral

5. My baby will benefit from my cleaning his/her teeth.

☐ Strongly Agree

☐ Strongly Disagree

☐ Agree

☐ Disagree

☐ Neutral

6. I like the idea of a health person putting medicine on my baby's teeth to protect them from getting cavities.

☐ Strongly Agree

☐ Strongly Disagree

☐ Agree

☐ Disagree

☐ Neutral

7. Dental visits are as important as regular medical check-ups.

☐ Strongly Agree

☐ Strongly Disagree

☐ Agree

☐ Disagree

☐ Neutral

8. My baby gives me a hard time when I try to brush his/her teeth.

☐ Strongly Agree

☐ Strongly Disagree

☐ Agree

☐ Disagree

☐ Neutral

9. I am able to put my baby to sleep without feeding/nursing him/her.

☐ Strongly Agree

☐ Strongly Disagree

☐ Agree

☐ Disagree

☐ Neutral

10. My baby is happier, when I give him/her something sweet in his/her bottle.

☐ Strongly Agree

☐ Strongly Disagree

☐ Agree

☐ Disagree

☐ Neutral

11. Foods and drinks that are not sweet, don't taste good to my baby.

☐ Strongly Agree

☐ Strongly Disagree

☐ Agree

☐ Disagree

☐ Neutral

12. Putting a child to bed with a bottle containing milk can cause cavities.

☐ Yes

☐ No

☐ Don't know

13. Putting a child to bed with a bottle containing juice can cause cavities.

☐ Yes

☐ No

☐ Don't know

14. Fluoride helps prevent tooth decay.

☐ Yes

☐ No

☐ Don't know

15. Fluoride can be used to coat and protect the teeth of infants and children.

☐ Yes

☐ No

☐ Don't know

16. Bacteria and germs on the teeth help to produce cavities.

☐ Yes

☐ No

☐ Don't know

17. Adults who have cavities can pass tooth decay germs to their children.

☐ Yes

☐ No

☐ Don't know

18. Baby's should have their teeth cleaned/brushed regularly by their parents.

☐ Yes

☐ No

☐ Don't know

19. Do cavities in baby teeth need to be filled?

☐ Yes

☐ No

☐ Don't know

20. Has a doctor or nurse ever told you when your child should be off the bottle?

☐ Yes

☐ No

21. Has a doctor or nurse ever told you how to clean your child's teeth?

☐ Yes

☐ No

22. Has a doctor or nurse ever told you when your child should begin seeing the dentist?

☐ Yes

☐ No

23. At what age should a child first see a dentist?

☐ at 1 year

☐ at 3 years

☐ Older than 3 years

☐ Don't know

24. Do you brush/wipe your child's teeth daily?

☐ Yes

☐ No

25. Is toothpaste/cleanser used?

☐ Yes

☐ No

If yes, does the toothpaste/cleanser have fluoride?

☐ Yes

☐ No

☐ Don't know

26. Does your child use a bottle or sippy cup for a nap or at night?

☐ Yes

☐ No

27. Has your child had their first visit to the dentist?

☐ Yes

☐ No

If yes, what was there age at the time of the visit? months

If your child had dental check-up, did they have cavities?

☐ Yes

☐ No

If your child had dental check-up, was fluoride placed on their teeth?

☐ Yes

☐ No

ID have or have you had cavities in you teeth in the past 5 years?

☐ Yes

☐ No

☐ Don't know

Are you Hispanic or Latino?

☐ Yes

☐ No

In your opinion, which group best represents your race?

☐ American Indian or Alaska Native

☐ Asian

☐ Other

☐ White

☐ Black/African American

☐ Native Hawaiian/Pacific Islander

How many years of education do you have?

☐ Less then High School

☐ High School/GED

☐ Some College/Technical School

☐ Finished College

What is your age? Years

Child's age? months

Number of Children in Household

Adults in household that will help care for your child besides you?

number

Table 1: Demographics[Error! Not a valid link.](#)

Table 2: RAPIDD Responses

Question	Period	RAPIDD responses (n)					Mean	SD	SA%
		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree			
Openness to Health Information									
1. I get help on how to take care of my baby from TV, magazines, newspaper, books or the internet.									
	Pre	19	40	20	7	1	2.21	0.92	22
	Post	25	38	13	7	1	2.06	0.95	30
	1yr	3	4	4	1	0	2.25	0.97	25
2. It will be easy to change any habits I may have to help decrease my child's chance of getting cavities.									
	Pre	29	39	12	7	0	1.97	0.90	33
	Post	37	30	12	5	0	1.82	0.89	44
	1yr	2	8	1	1	0	2.08	0.79	17
3. I feel comfortable asking questions at my health care provider regarding the baby.									
	Pre	76	10	0	1	0	1.15	0.45	87
	Post	77	7	0	0	0	1.08	0.28	92
	1yr	10	2	0	0	0	1.17	0.39	83
4. Keeping my baby's teeth healthy is important to me.									
	Pre	83	4	0	0	0	1.05	0.21	95
	Post	80	4	0	0	0	1.05	0.21	95
	1yr	10	2	0	0	0	1.17	0.39	83
Average of questions 1-4									
	Pre						1.59	0.38	59
	Post						1.50	0.38	65
	1yr						1.67	0.34	52
Valuing Dental Health									
5. My baby will benefit from my cleaning his/her teeth.									
	Pre	73	10	4	0	0	1.21	0.51	84
	Post	77	7	0	0	0	1.08	0.28	92
	1yr	11	1	0	0	0	1.08	0.29	92
6. I like the idea of a health person putting medicine on my baby's teeth to protect them from getting cavities.									
	Pre	19	37	22	8	1	2.25	0.94	22
	Post	44	26	12	1	1	1.68	0.85	52
	1yr	6	2	3	1	0	1.92	1.08	50
7. Dental visits are as important as regular medical check-ups.									
	Pre	54	25	5	3	0	1.51	0.76	62
	Post	64	19	1	0	0	1.25	0.46	76
	1yr	8	4	0	0	0	1.33	0.49	67

Average of question 5-7

Pre						1.64	0.53	56
Post						1.34	0.37	73
1yr						1.44	0.41	69

Post Partum Questions

8. My baby gives me a hard time when I try to brush his/her teeth.								
1yr	0	3	3	4	1	3.27	1.01	0
9. I am able to put my baby to sleep without feeding/nursing him/her.								
1yr	3	2	0	5	1	2.91	1.51	27
10. My baby is happier, when I give him/her something sweet in his/her bottle.								
1yr	2	2	1	2	3	3.20	1.62	20
11. Foods and drinks that are not sweet, don't taste good to my baby.								
1yr	1	0	2	7	1	3.64	1.03	9

Abbreviations: SD = standard deviation, SA % = percentage "strongly agree". The mean and SD were calculated using an SA scored as 1 thru SD scored as 5.

Table 3: Analysis of RAPIDD responses

Area	Time	RAPIDD responses (n)				p-value
		LS Mean	SE	95% CI		
Openness to Health Information						0.0039
	Pre	1.59	0.040	1.51	1.67	
	Post	1.50	0.041	1.42	1.58	
	1yr	1.67	0.076	1.52	1.82	
Valuing Dental Health						<.0001
	Pre	1.64	0.049	1.55	1.74	
	Post	1.34	0.050	1.25	1.44	
	1yr	1.50	0.115	1.27	1.73	

Table 4: Infant Oral Health Knowledge

Question	Period	Response		%Yes
		No	Yes	
12. Putting a child to bed with a bottle containing milk can cause cavities.				
	Pre	5	60	92
	Post	2	82	98
	1yr	0	10	100
13. Putting a child to bed with a bottle containing juice can cause cavities.				
	Pre	0	79	100
	Post	0	84	100
	1yr	0	11	100
14. Fluoride helps prevent tooth decay.				
	Pre	0	76	100
	Post	0	83	100
	1yr	0	10	100
15. Fluoride can be used to coat and protect the teeth of infants and children.				
	Pre	5	55	92
	Post	5	78	94
	1yr	0	9	100
16. Bacteria and germs on the teeth help to produce cavities.				
	17Pre	7	76	92
	Post	2	82	98
	1yr	1	9	90
17. Adults who have cavities can pass tooth decay germs to their children.				
	18Pre	35	20	36
	Post	1	83	99
	1yr	1	8	89
18. Baby's should have their teeth cleaned/brushed regularly by their parents.				
	Pre	0	77	100
	Post	0	84	100
	1yr	0	11	100
19. Do cavities in baby teeth need to be filled?				
	Pre	16	32	67
	Post	4	78	95
	1yr	0	10	100
20. Has a doctor or nurse ever told you when your child should be off the bottle?				
	Pre	68	14	17
	Post	46	36	44
	1yr	8	3	27
21. Has a doctor or nurse ever told you how to clean your child's teeth?				

Pre	62	23	27
Post	29	55	65
1yr	1	10	91

22. Has a doctor or nurse ever told you when your child should begin seeing the dentist?

Pre	60	25	29
Post	17	67	80
1yr	1	10	91

Table 5: Preventive Infant Oral Health Behaviorss

Question	Period	Response		%Yes
		No	Yes	
24. Do you brush/wipe your child's teeth daily?				
	1yr	1	10	91
25. Is toothpaste/cleanser used?				
	1yr	4	7	64
26. Does your child use a bottle or sippy cup for a nap or at night?				
	1yr	8	3	27
27. Has your child had their first visit to the dentist?				
	1yr	9	2	18
28. If your child had a dental check-up, did they have cavities?				
	1yr	3	0	0
29. If your child had a dental check-up, was fluoride placed on their teeth				
	1yr	1	1	50
30. Do you have or have you had cavities in your teeth in the past 5 years?				
	1yr	3	7	70

Table 6: Dental Home

19. At what age should a child first see a dentist?

Period	Don't know	at 1 year	at 3 years	Older than 3 years
Pre	22	49	16	0
Post	0	83	1	0
1Yr	1	9	1	0

VITA

Andrew David Zima, Jr. was born on August 14, 1976 in Pittsburgh, Pennsylvania and is an American citizen. He moved to Richmond, Virginia in 1977 where he grew up and graduated from Monacan High School, Chesterfield County Virginia, in 1994. Andrew then obtained a Bachelor of Science in Mechanical Engineering from Virginia Tech in 1999 and a Master of Science in Mechanical Engineering from Virginia Tech in 2001. He subsequently began working for DuPont® Tyvek as a Product Development Engineer. Andrew decided to pursue a career in dentistry and completed pre-dental courses at Virginia Commonwealth University where he was then accepted for dental school. Andrew graduated from the VCU School of Dentistry in 2008 where he was awarded the VCU Oral Biology and VCU Pediatric Dentistry awards. During his dental education Andrew completed research projects about composite material bonding strength and pediatric esthetic crown facing retention. Andrew's aspirations of becoming a Pediatric Dentist became a reality and he started his residency at VCU School of Dentistry in July of 2008. Andrew's planned graduation from his Pediatric Dental residency is in June 2010; after which he will work at his own Pediatric Dental office in Mechanicsville, Virginia.